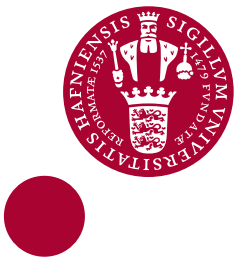

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Published in:
International Journal of Urban and Regional Research

DOI:
10.1111/1468-2427.12549

Publication date:
2017

Document version
Peer reviewed version

This is the author's postprint version of an article in *International Journal of Urban and Regional Research*, vol. 41, issue 6, November 2017, pp. 926-945. The authoritative version can be found here: https://doi.org/10.1111/1468-2427.12549

The present research benefitted from funding from the European Research Council (ERC). ERC Grant: State Formation Through the Local Production of Property and Citizenship (Ares (2015)2785650 – ERC-2014-AdG – 662770-Local State).

SPATIAL PRACTICES AND INSTITUTIONALIZATION OF WATER SANITATION SERVICES IN SOUTHERN METROPOLISES

The case of Jakarta and its Kampung Kojan

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Abstract

This article examines the spatial practices and forms of institutionalization in the water and water sanitation sector in Jakarta, capital of Indonesia, and especially in Kampung Kojan in the Kalideres Subdistrict of Jakarta. To this purpose it develops a three-layered analytical framework viewing the city as a multi-scalar socio-ecological system in which different forms of human-water relations and their institutionalization occur.

Particular attention is given to informality in this system and how it interacts with 'regular' state and corporate market sector practices. Within these interactive dynamics, informality is not only understood as survival strategies but also as creative practices connecting social-ecological opportunities, traditional and contemporary technologies and modes of institutionalization to each other.

On-going institutionalization processes in the formal and informal economy as well as between them are analysed. Opportunities to integrate and regularize the diverse water sanitation services into community-led closed water-wastewater cycles capable of ensuring public health and sustaining a bio-hydrological balance at the local level are explored.

Keywords: water (sanitation) services, informality, urban metabolism, waterscape, institutionalization, southern metropolises, Jakarta

Acknowledgments

The research was made possible with the generous support from the Vlaamse Interuniversitaire Raad/ University Development Cooperation (VLIR-UOS), as well as Dr. Teti Argo and Dr. Ibnu Syabri who hosted our fieldwork at the Regions and Infrastructure Research Center, Institut Teknologi Bandung, Indonesia. The authors thank various respondents during the interviews and Setiaji Wibowo who assisted the field work. Seminar discussions within the Planning and Development Unit, KU Leuven, have shaped the arguments in this article; sincere gratitude goes to the colleagues within the Unit. The authors also thank Erik Swyngedouw, Adriana Allen and five IJURR referees for their valuable suggestions. The content of the article and any remaining shortcomings are, of course, the authors' responsibility.

1. Introduction

This article works with a triple-layered analytical framework to study diverse water and sanitation services and their multiple institutionalization forms in cities of the Global South, by pivoting on the analytical concept of informality and applying it to Jakarta and one of its kampungs i.e. Kampung Kojan. *Two main analytical concerns* lay at the basis of the design of this framework.

First, the framework should explain the (re)production of agency and institutions within overlapping and scalarly articulated territories of water-related services embedding diverse forms of informality. Informal practices and processes are impregnated not only by local dynamics but also articulate with the multi-scalar socio-economic system (Castells & Portes, 1989; Kesteloot & Meert, 1999; Mingione, 1991) and the complex socio-ecological system that embeds it (Walker, 2014). Echoing Mingione (1991), Kesteloot and Meert (1999) argue that through such articulation, variation in the informalization of economic relations increases at the local scale.

The concept of 'informality' as a mode of economic production and allocation has been widely accepted in the analysis of urbanization processes in the Global South (for reviews see Roy, 2005, 2010). Contemporary studies on urban informality are in line with the critical perspective introduced by Mingione in 1991, and regard urban informality as practices of valuation and negotiation rooted in a broader socio-economic and socio-political metabolism involving statutory and non-statutory institutionalization processes (see McFarlane, 2012; Roy, 2005).

The world of water and sanitation services in Southern metropolises expresses the features of informality cogently (see also Kooy, 2014). Accordingly,

studying the fluid urban water sector in Jakarta requires a comprehensive examination of its agency and institutionalization as part of the waterscape – a metaphor for the overall socio-hydrological system. Households and neighbourhood communities hold a prominent role in water sanitation services and address more than local needs. As has been argued by Miraftab (2004), an involvement of household members in managing the neighbourhood sanitary conditions, very often in informal ways, also germinates new discourses and practices fitting the ambitions of neoliberal agendas in reducing state expenditures for environmental protection.

Second, the analytical framework should embrace the water and sanitation problematic in an integrated way. The socio-economic and socio-political metabolism metaphor should include the entire multifaceted bio-geochemical cycle of water (from precipitation to evaporation) as embedded in the overall socio-ecological metabolism of the urban system. As part of these dynamics, the framework should seek to induct the socio-political dynamics into the modernist perspective, which reductively links improved socio-ecological conditions to advances in technology and organization.

Yet the modernist logic still dominates the major infrastructure works in the water and sanitation sector and remains its drift in its institutionalization discourse and practice. This logic is built on a functionalist conception of the water system that breaks up the loop of water into sections, thus separating ‘clean water’ from other water forms. Accordingly, practices are prescribed encouraging broader private sector supply of sectionalized services to fill lacunae in public service provision (see Bakker, 2003; Braadbaart, 2005). These prescriptions do not recognize the unevenness in opportunities for households and small enterprises to access ‘formal’ service provision; they deny the existence of different levels of

community vulnerability to the fast deteriorating urban environment; nor do they discern the holistic character of the metabolic processes interconnecting a diversity of water-based need satisfaction practices and their intrinsic interconnection.

Combining both *analytical concerns* has significant consequences for the way the roles, agencies and the institutionalization of different water service relationships are addressed in the analytical framework. Considering that the state or corporate market sector alone cannot meet or not even properly identify the needs and institutional relations among the urban poor in the Global South, desperately needed institutional reforms to solve water related problems should also involve so-called informal actors and their networks. The study and design of 'new' agencies should take into account the bio-geochemical conditions under which water sanitation services 'naturally' occur, offering alternatives to the conventional technologies and the modes of governance that modernist infrastructure systems have failed to provide.

At the light of these analytical concerns, this article disentangles the varying informalities embedded in the urban water and water sanitation sector by using a framework with three interrelated layers of explanation. The framework directly or indirectly makes use of theories in political economy (Bakker, 2007; Walker, 2014), political ecology (Swyngedouw, 2004; Swyngedouw et al., 2002), scalar geography (Brenner, 2001; Jonas, 2006; Swyngedouw, 1997) and territorial development (Moulaert & Nussbaumer, 2008) as well as the institutional and cultural turns these theories have adopted (Moulaert et al., 2016).

Scholars within Political Ecology stress the critical role of 'scale' to understand urbanization as social-ecological processes with varying dialectical

relations among different ecological and social entities that are socially constructed (Angelo & Wachsmuth, 2015; Rangan & Kull, 2009). They view cities not just as types of settlements or forms of physical containers, but as signifiers of greater urbanizing metabolisms with diverse relations of political actions for socio-ecological changes. Territorial development analysts consider 'territories' – mainly neighbourhoods or kampungs and their surroundings in this article – as places of social relationality, collective agency and deployment of resources embedded within these interscalar dynamics (Moulaert & Nussbaumer, 2008, p. 47).

The first layer unravels the production of the contemporary waterscape in cities of the Global South as a *multi-stage geographical-historical transformation process* through which a variety of agencies embedded in different socio-ecological spaces operate. ***The second layer*** explains water and sanitation development practices and processes *at the neighbourhood level*. In many cases, these dynamics can be attributed to uneven economic development resulting from ongoing economic restructuring and asymmetric institutionalization processes that involve (global) firms, state agencies as well as enterprises from the informal sector. ***The third layer*** analyses the reproduction of uneven development of the water sanitation sector and inequalities in access to services *across neighbourhoods*. It examines different modes of institutionalization of collective spatial practices, how they interact and hybridize.

This three-layered analytical framework has guided the analytical movements (cf. Lund, 2014), between empirically researching and conceptually summarizing water and sanitation practices and their institutionalization in *Jakarta* and in *Kampung Kojan* belonging to the *Kalideres Subdistrict*. In the colonial time, the indigenous word 'kampung' was used to label non-European and non-Chinese

settlements. Today an urban kampung is a typical spatial enclave in Indonesian cities in which informality takes on different yet articulated institutional and spatial forms. Kampung Kojan is representative of peripheral kampungs in Jakarta, surrounded by housing estates and industrial districts. Its historical-geographical trajectory goes back to the original ethnicity of Jakarta i.e. the Betawi people. It is a nexus of the struggle over water and has been the 'laboratory' of development initiatives by (multinational) water companies and NGOs for the last decade.

Fieldwork was conducted between May and December 2011, by way of participatory observation and interviewing household representatives and owners of rental rooms for workers who have benefited from a sanitation development project delivered by Mercy Corps, an international NGO. Key officers of the NGO and some local leaders were also interviewed. To learn about urban dynamics beyond the Kampung, several government officials and corporate leaders were interviewed between August 2010 and October 2012. Data from the interviews used in the analysis are acknowledged in footnotes. Information about planning procedures and projects in Jakarta was updated until 2015.

Five sections follow this introduction. Section two explains the three-layered framework and how it addresses the analytical concerns. Sections three through five are devoted to the empirical analysis of Jakarta and *Kampung Kojan*. Each of these sections focuses on one analytical layer, yet accounting for the connections between all layers. Section six wraps up the findings of the analysis and volunteers some prospects for integrated governance of the diverse practices of water and water sanitation services.

2. A Three-Layered Analytical Framework

Figure 1 summarizes the role of each layer in the analytical framework as well as the connections among them. The common principle binding the analytical framework is that water as a natural element is also a product of complex social dynamics. Securing water supply is part of a greater (conflictive) socio-ecological process inside and outside the city (see Swyngedouw, 2004). The city itself consists of different yet connected socio-ecological environments that are 'actively and historically produced' by multiple actors (agents), with different capabilities to influence the urban metabolism processes (Swyngedouw et al., 2002) and the institutionalization of spatial practices in the city (Lambooy & Moulaert, 1996).

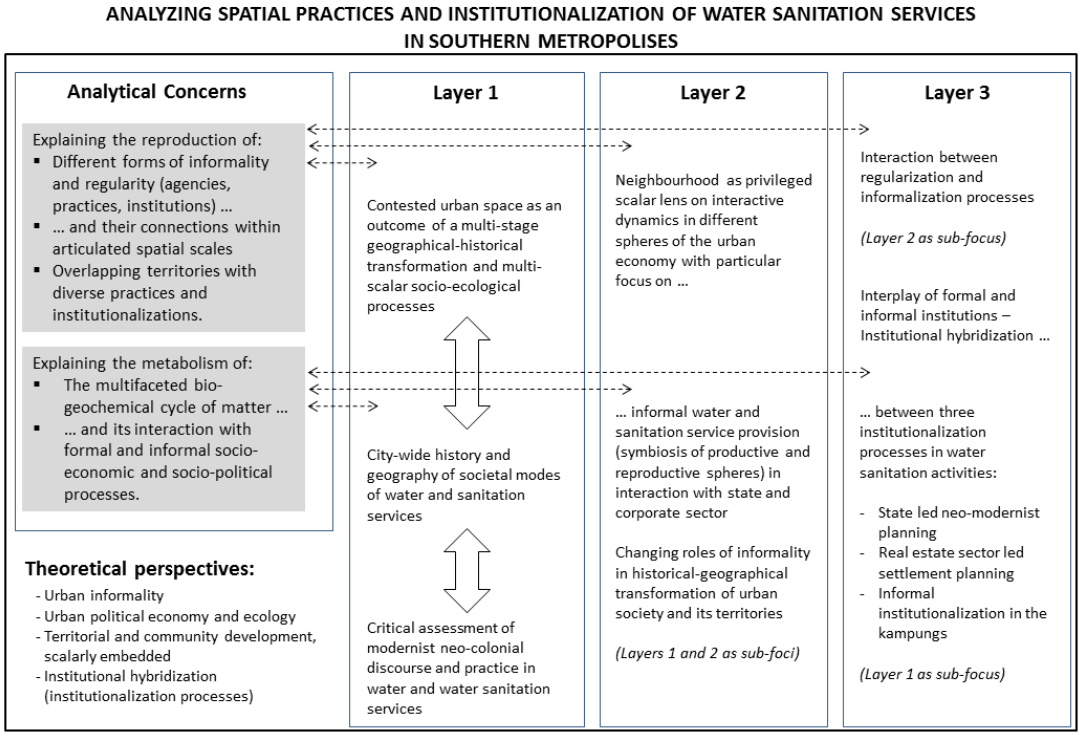

Figure 1 *[to be placed about here]*
The Analytical Framework
Source: the authors

Layer one of the analysis is built on the existential assertion that communities in the city use water within a contested and fragmented urban space. As an epistemological premise to the two other analytical layers, the first layer unfolds dual complexities in the water and sanitation sector as the expression of relationships between human and non-human actors through time and space. Appropriation and uses of urban space are determined by human-human and human-nature relations in which informal practices are ubiquitous. The contested urban space is the outcome of intertemporal and territorial articulations of these social-ecological configurations. Intertemporal dynamics refer to the multiplicity of temporal dimensions with different yet interconnected institutional settings arising across time, often operating at the same time (Massey, 2005).

In water sanitation services, different corporate-, state- or community-led infrastructure networks have their own temporal cycles of institutionalization to keep them functioning within or beyond their technical ambitions (Putri, 2016; Ranganathan, 2014). While in pre-industrial societies the production and reproduction spheres formed a unity, with industrialization they became increasingly separated. But industrialization indirectly also triggered a new rapprochement between both spheres. Irregular household income structures resulting from uneven industrialization forced people to turn to more traditional systems of ‘self-service’ water sanitation provision or to live in cheaper areas where only such servicing is available.

From time-space analysis of urban development, we learn that the modernity approach focusing on large scale technology and centralized

management has significantly shaped the configuration of both the colonial and post-colonial city and their waterscape (Gandy, 2008; Kooy & Bakker, 2008). When interpreted and applied linearly, the modernist vision considers the water-related problems and practices in the Global South as inherent to a development stage that is far behind that of advanced-industrialized Northern countries. Repeatedly resonated by international organizations and corporate enterprises, this misunderstanding keeps policy makers in Southern countries adopting the modernist urban ideals of advanced industrialized countries and corporations, despite the failure of corporatization, privatization and commodification schemes (see also Bakker, 2007; Dagdeviren, 2008). Thus the belief persists that uncontextualized transfers of the Northern institutional and technological models to the Global South will drive its development forward. Such transfer reserves a lead role to corporate market players in building the water and water sanitation services infrastructures, in which a commodification – often meaning: annihilation – is taking place of nature and community-based relationships that traditionally matter for protecting the neighbourhood socio-ecological environment (see also Miraftab, 2005).

Grounded in the time-space dialectics of modernist versus traditional, productive versus reproductive, informal versus regular activities, the ***second layer*** highlights the characteristics of the informal water and sanitation sector and emphasizes its internal differentiation within the urban socio-ecological system, especially by reflecting on the role of informality. It scrutinizes the symbiosis between the formal and informal economy as well as between productive and reproductive spheres. It explains the actual meaning of the interplay between

informality and formality in water and water sanitation services that determines household strategies in meeting basic sanitation needs.

Enzo Mingione (1991) laid the foundations for analysing ‘informality’, situating it within the interactive dynamics of different sectors in the economy and society as a whole. Commencing with a theoretical discussion of the broad concept of *work* through which humans fulfil the needs of material survival, he explains how industrialization, as it determines societal transformations today, requires a broad range of associative regulatory processes. Together with ‘regulatory’, also ‘informalization’ processes are active within industrial transformation processes. 'Informalization' processes materialize through the diffusion of informal activities, such as reciprocal arrangements that respond to economic tensions stemming from industrialization. Informal practices are not only survival strategies for families and communities, they also constitute a pool of practices promoted by global agents pursuing neoliberal agendas at the local level (Roy, 2005; Swyngedouw, 1997).

Mingione avoids putting the formal and informal economy into binary opposition, and does not name ‘regulatory processes’ as ‘formalization’; he argues that ‘regulatory processes’ are connected and developed along the same lines as ‘informalization’ (Mingione, 1991, p. 85). Both types of processes form part of ‘a cycle of successive adjustments’ pushed by interest groups, mainly to reduce or effectively remove obstacles (Ibid.,1991, pp. 116-117). Thus, ‘informality’ is not a static condition, and the distinction between formal and informal is possible only when and where the economy is subjected to a relatively high degree of regulation by the state, business corporations and the associative institutional regulatory system (Ibid.,1991, pp. 84-86, 108, 118).

The strict division of work types generated by the modern industrialization process has ‘brought about a variable and changing degree of separation of productive human behaviour from an originally unified productive-reproductive collective organization based on reciprocity’ (Ibid.,1991, p. 190). The informal economy, in contrast, maintains the interwoven nature of productive and reproductive activities. As regular services become unaffordable, inaccessible or dependent on the low cost structure of informal inputs, informality and symbiosis between productive and reproductive spheres intensify. Very often unreliable (formal) incomes have been a main factor of growing informal economy networks (Castells & Portes, 1989). As discussed by, among others, Kesteloot and Meert (1999) and Mingione (1991, p. 185-190), there exists a diffuse and variable form of reciprocity in informal service relations that does not fit economic regularization processes, but sustains diverse modes of community service provision with their specific institutionalization processes.

In urban Indonesia, informal specialized community services have flourished in parallel with the rapid population growth to provide inhabitants in kampungs with cheap catering, laundry and cleaning services. Many of these services contribute to ease the burden of domestic work of middle and high income classes while offering additional income to low income groups. In the field of water and water sanitation, informal provision includes services that emerge either outside or in interaction with the state/ market provision systems. In Jakarta’s kampungs, community services are accessed to a large extent through (informal) redistribution and non-monetary exchange like solidarity and self-help networks often advocated or coordinated by civil society organizations. However, such solutions for meeting day-to-day sanitary

needs are exposed to external pressures stemming from ambiguous market regularization ambitions and ambivalent state performance.

Focusing in on the dialectics between regularity and informality embodying diverse institutionalization processes, ***Layer three*** of the analytical framework addresses the hybrid institutionalization of spatial practices in accessing water and sanitation services. It recognizes different spatial scales (i.e. the Kampung, neighbourhood, urban Jakarta) as well as the articulation between them (e.g. spatial practices and agreements to connect informal on-site services to the city-wide state-controlled infrastructure networks).

In line with Loftus (2009), it can be argued that everyday struggles for water fuel the urban territorial processes, in which localized yet scalarly embedded social relations and institutionalizations often materialize in place-linked communities (Moulaert & Nussbaumer, 2008). It is within the everyday practices of everyday agency that spatial knowledge is materialized, thus fuelling and creatively transforming the institutionalization of water and sanitation practices (see Loftus, 2007). By focusing on the hybridization among diverse territorially rooted and scalarly connected institutionalization forms, layer three reveals how regular and informal spatial practices engage with the socio-ecological system of an urban region and how institutions arise from this engagement; how institutionalization processes give rise to different spatially articulated, often hybridized governance institutions.

After a long history of ‘decentralized’ water sanitation systems established at the traditional kampung level, massive investment in water and sanitation infrastructure in urban Jakarta produced a new arena of capital accumulation. This

accumulation supported by centralized land-use planning took place without engaging with the complexity of the social and cultural institutions embedded in the kampungs and their communities. Water utilities that once were regulated centrally by the colonial and post-colonial state were turned over to the private sector, thus stimulating the creation of ‘premium networked spaces’ at the expense of areas falling beyond the reach of the state and corporate spatial planning (Graham, 2000, 2002). At the same time ‘decentralized’ traditional and new small scale sanitation infrastructures have (re)discovered their way to the kampungs. Fragmented urban spatial patterns, including the uneven geographical distribution of basic sanitation services are (re)produced through continuous negotiation between multiple forms of regularization and informalization between a diversity of actors.

Thus three main modes of institutionalization and their interaction conceptually underpin layer three: the state spatial planning system in the modernist tradition that exists in advanced symbiosis with the corporate market sector; the procedures applied by real estate developers; the institutionalization in kampungs situated in the grey area of regularization and informality. These modes of institutionalization interactively affect the development and the potential of integrated governance of the water and sanitation services in the urban territories of Jakarta.

3. Space-time Dynamics of Jakarta's Waterscape

Guided by the first analytical layer (time-space analysis), this section elucidates the history of Jakarta's waterscape as a metabolic socio-ecological system shaping and shaped by fragmented yet intertwined territories of diverse water and water sanitation practices.

In the mid eighteenth century, while the colonial port-city Batavia was dominated by the Europeans and Chinese, kampungs in the southern areas were mainly occupied by indigenous communities with a traditional economy based on subsistence agriculture and commerce (Abeyasekere, 1989). These traditional communities, individually or collectively and through a diversity of means, had access to water and sanitation being part of a closed water circuit. But the nineteenth century development of the inland town led to land shortages and forced communities to abandon their subsistence agriculture system (Elson, 1986). The changing relationship between communities and their lands affected the domestic water cycle; modern water infrastructures were introduced and interfered with the traditional water-cycle logic in community gardens and fishponds, through which ground water flowed into traditional wells. Such socio-ecological transformations have affected Jakarta's contemporary urban waterscape. Figure 2 shows the overlapping and conflictive networks of rivers, canals, water pipes and roads that are sustaining different, yet interdependent, sets of socio-ecological relations in Jakarta.

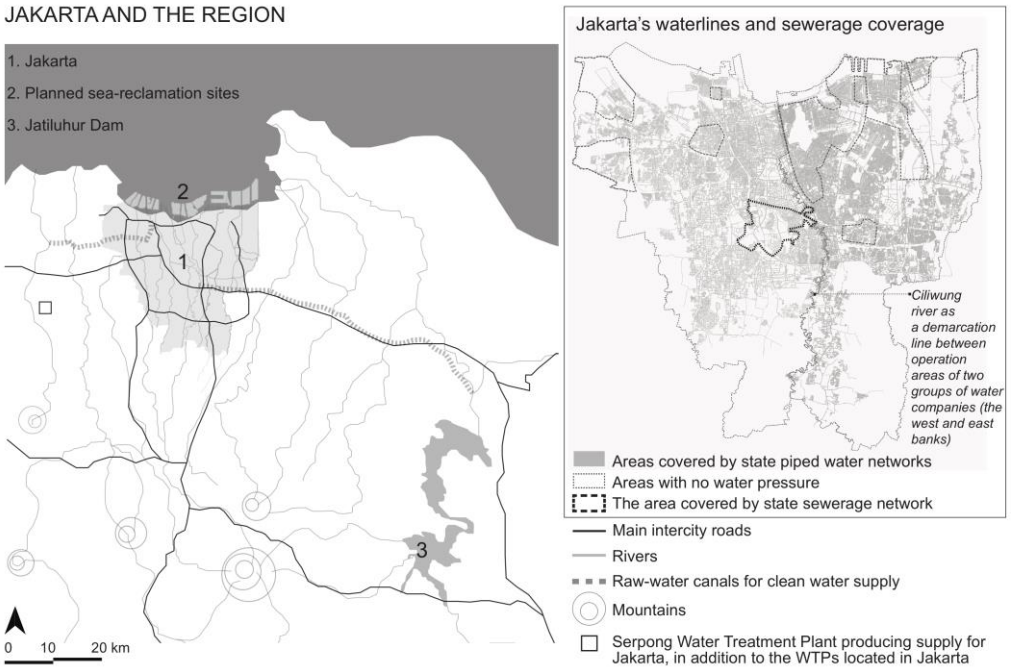

Figure 2 *[to be placed about here]*
The Socio-ecological Networks of Jakarta
Source: compiled and redrawn by the main author based on data and maps issued by PAM Jaya (the provincial-state water company) and maps issued in Jakarta Master Plan 2030

Today, for many of Jakarta's kampung communities, the thirteen rivers flowing across the low lands remain crucial resources for living, cultivation and transportation. However, the quality of their activities keeps decreasing because the rivers also function as open sewers. The 'centralized' sewerage system began to operate in 1983 and up to now covers a mere two per cent of the Jakarta area. Septic tanks form the backbone of the decentralized sewerage system for waste water collection. But there are only about two million septic tanks in the urban area for a population of about thirteen million; and they are often leaking, thus polluting the soil and water bodies (Miller, 2006; Yachiko Engineering, 2012). The municipality and licensed private enterprises operate around 188 trucks to empty these septic tanks and haul the sludge to two dedicated treatment plants. There is

frequent illegal discharge of sludge into nearby open water bodies, as many operators - including informally sub-contracted and non-registered - prefer to keep transportation costs low by avoiding remote septage treatment plants.[1,2]

The polluted rivers, charged by the history of uneven modernization, not only bring calamities to poor communities, especially during the driest days and the beginning of the rain season, but also exacerbate the problems of water resource management for the two piped water companies in Jakarta. Production costs for clean water provision keep increasing, leading to higher water tariffs.[3] In fact, to provide water to the urban population in the low lands of Jakarta has been socially conflictive since the colonial era. In 1873, water provision was organized collectively for the first time when the state constructed artesian hydrants that were individually connected to European houses through local pipe networks (Kooy & Bakker, 2008). Following insufficient supply of clean water, twentieth century Batavia was served with spring water from the southern mountains via 50 kilometres of iron pipes, especially to still the thirst of its wealthy families.

After independence, in the period 1950s-1990s, the water provision system was further modernized with the construction of seven water treatment plants through which every second nearly 18,000 litres of surface water are channelled for purification. Around 80 per cent of this volume comes from the Jatiluhur Reservoir, transported through the 70 kilometres West Tarum Canal by means of 17 hydraulic pumps (IndII, 2010). But the political and technological efforts to pump, treat and

1 An official of PDPAL Jaya during interviews on 7 and 20 January 2011.

2 An official of Jakarta Cleansing Agency in an interview on 27 March 2012.

3 A technical expert of PALYJA, interviewed on 8 November 2010.

distribute water could not meet the challenge of bringing water to the entire urban population. Currently, the piped water networks cover about 62 per cent of the Jakarta area, but only around 800,000 households are listed as subscribers of the state water company.[4]

Thus Jakarta's waterscape with its water and sanitation infrastructure is a result of the historical-geographical articulation of traditional, colonial, and modernist modes of development. Today, it is formed by diverse spatial practices with their own technologies and modes of institutionalization, all of which have a certain level of permeability. For example, state networks are illegally connected to many (informal) settlements and non-revenue water 'leaks' to benefit not only poor households but also to corrupt bureaucrats who levy a commission on such connections. At the same time, pollutants contaminate the water supply due to technically failing pipe networks; and untreated wastewater cannot be stopped from penetrating the open canals that convey raw water to water supply treatment plants. In addition to the bio-geochemical permeability, a variety of institutional logics diffuse across different water infrastructure systems.

In this symbiotic urban socio-ecological system of Jakarta, distinctions and connections between formal and informal water and sanitation service provision cannot solely be mirrored onto piped versus non-piped or centralized versus decentralized technological systems (see also Kooy, 2014). Such dual categorizing flouts the fact that the popular use of non-piped technologies such as individual household septic tanks or the widespread consumption of bottled drinking water has always been encouraged by formal policies and legal regulations. While the

[4] Official presentation of the chief director of PAM Jaya, 30 June 2011.

grand policy discourse on Jakarta wastewater management is mainly resonating the dualism ‘centralized-decentralized’ of technological systems and not so much the ‘formal-informal’,[5,6] institutionalization practices on the ground in contrast tend to recognize the vital roles of informality and its connections with the regular services.

4. Water Sanitation and Informality in Kampung Kojan, Jakarta

Following the logic of the *second analytical layer*, stressing the individual and community practices in water and sanitation services within the informal economy, the highly permeable membranes of the so called ‘productive’ and ‘reproductive’ spheres of the informal economy not only mould the modes of the community service production, but also the service relation patterns in both the formal and informal provision systems. Regular (market, state) service suppliers who become active in the Kampung therefore have to attune themselves to a diversity of mainly informal small-scale yet interconnected initiatives that are predominant there.

Kampung Kojan is surrounded by factories, warehouses, logistics providers and supply chain industries, but also by gated housing estates that began to grow in the late 1970s. The Betawi people, acknowledged as the original ethnic group of Jakarta, dominate the kampung’s cultural-political constellation, with most neighbourhood leaders and landowners being Betawi. The actual population covers

5 Several government officials during several interviews.

6 Sessions and discussions during the national conference of water and sanitation on 18 January 2011.

at least four generations, and according to witness reports some community members had moved into the area after being evicted from other areas in Jakarta.[7]

Around 6,000 people or between 1,500-1,700 families live in Kampung Kojan.[8] Many households have irregular employment relations with national and international companies; and others have no proper occupation in the formal job market but work as petty traders or in the informal economy in diverse service activities. Regular employment (blue collar workers and low-level employees) accounts for only around 16 per cent of the population. Partly in parallel with the more frequent circular migrations, the level of informal employment is high.

There are intimate links between the (informal) job and the (informal) housing market. For a large part of the population, fragile income conditions impede access to land and home ownership. Some 41 per cent of the households in Kampung Kojan rent a house or room (SUEZ Environment & Mercy Corps, 2010). Many Betawi people have constructed rooms to be rented out, to respond to a high need of cheap housing for the workers. These rooms are located on the former agriculture land. The number of rental rooms built by and managed under the same owner or operator varies, but most estates are small-scale,[9] probably because the agricultural lands have been divided among family members or sold parcel-wise to migrants.

[7] As witnessed by some community members in several interviews.

[8] Data from RW 6 leader, October 2011.

[9] In the Kampung, of the 34 landlords listed as beneficiaries of Mercy Corps, 29 own less than ten rooms (the Program of Urban Sanitation and Hygiene Promotion, Mercy Corps 2010).

Built on relatively small plots of land, not all housing units provide latrines and bathrooms for the tenants. If available, these facilities are used collectively by tenants and sometimes shared also with the owners. Meeting the high demand for sanitation facilities, four public latrines in Kampung Kojan have been operating appropriately until recently but are now in decline. Manifestly, unequal income structures have led to different levels of investment by landlords and tenants in water and sanitation infrastructures. Because members of low income groups frequently have to change jobs and home, many landlords in the Kampung are reluctant to upgrade the sleeping shelters, not to mention spending resources on improving water and sanitation facilities, even for themselves.

In general, the inhabitants living in individually owned houses or rental rooms have limited access to piped-water or proper sewage collection services. This situation will not improve as Kampung Kojan is excluded from the future sewerage infrastructure expansion projects. Water and sewerage companies tend to prioritize communities with stable land tenure status, and inhabitants with reliable purchasing power like those living in regular housing estates outside the Kampung. The state has taken some initiatives to integrate the urban poor in the state- and market-led water and sanitation service provision systems. But as they have been designed to address mainly the technological infrastructure problems of service provision, these initiatives required institutional reforms which are hard to accomplish in the Indonesian context.

In early 2008, one of the private water operators PALYJA launched a project as part of the World Bank Global Partnership on Output Based Aid (GPOBA) programme. Preceded by a socio-demographic research conducted by Mercy Corps for the GPOBA, this project has extended the city water pipe network to

some kampungs. Piped water now reaches 58 per cent of the households in Kampung Kojan. The project has also regularized the connections to the piped-water network of those who had previously been 'illegally' channelling water from the network to their houses.[10]

However, due to the lack of water pressure, the GPOBA water subscribers suffer from intermittent supply and often have no alternative but to tap from shallow wells for their water provision. Topography plays a significant role in this; Jakarta is a coastal city located just above sea level, with several areas, including Kampung Kojan, having low or often no water pressure in their piped-water network. The water company PALYJA thus has difficulty delivering water to these places via the centralized system.

While corporate market providers consider clean water as a market-worthy commodity, they find investing in the water sanitation sector unprofitable. For many decades the responsibility of wastewater management had been left to individual households, thus causing urban environmental decay and increasing sanitation costs in general. The state recently changed its position towards urban wastewater management and began to speed up the pace of sanitation infrastructure development. So-called state-facilitated decentralized wastewater treatment has become a key plank of sanitation development in Indonesia (*Percepatan Pembangunan Sanitasi Permukiman*, the 2009 national acceleration program for urban sanitation development).

[10] The leader of a compound administrative unit *Rukun Tetangga* 7 (RT 7), in an interview on 5 October 2011.

The state strategy of decentralizing wastewater management can be seen as a way to accommodate the heterogeneity of environmental problems within the fragmented urban fabric. Nevertheless, state involvement remains insufficient and communities are burdened with responsibilities of environmental management which they are seldom up to (see Miraftab, 2005). This brings about a real challenge for the households who after having paid for the water to private suppliers, are faced with insufficient purchasing power to cover public or private environmental protection costs. Still they are expected to keep their wastewater from polluting the wider urban ecological landscape and troubling the piped-water production by their own means. This ambiguous relationship between affordability and necessity pushes them even further into informality.

Asymmetric permeability and weakening reciprocity

A neighbourhood with high population density definitely needs a collective water management system to keep up its waterscape. Apart from being polluted, wells are drying, and the engineering of ground water recharge is beyond the capability of individual households and needs a collective venture.

But the kampungs do not have access to the assets required to build a cohesive community driven water provision and sanitation infrastructure which they could govern collectively. Hence, many types of informal community water and sanitation services keep growing as short-term survival tactics of individual households. These services are supported by overlapping reciprocity-based networks involving households and communities. Kinship and friendship, among others, are fundamental social relations for households' survival strategies. Many

inhabitants in the Kampung are still relatives, living in a close social proximity to share water and sanitation facilities, as the following example illustrates.

Sn, a 30 year-old female, lives with Sr, a widow, in a household of three generations with five bread-winners and three children. She explains:

> We are using a manual pump … we are also connected to the piped water of our relatives' house. In case the pump is not working, the water from the next house is channelled to this house….If the [piped] water is not running, they come to us. [With the new latrine supported by Mercy Corps] we don't have to defecate in the canal anymore… sometimes other relatives stop by to use [the latrine].[11]

Sharing facilities among neighbouring households is common. This tradition of resource sharing has now been valorised by the water company, but on its own terms and to its own benefit; the strategy to expand the piped water network in Kampung Kojan involves the utilization of shared meters. But sharing water meters does not motivate households to associate themselves to gain improved general access to water service provision. When facing an intermittent supply, households still rely on filthy water from the canal for laundry and cleaning as the only available alternative.

[11] Sn and Sr were interviewed on 22 September and 22 October 2011.

Drinking water is prepared by boiling water or purchasing it as ready-to-drink water in refillable containers provided by small local vending stations that have been operating in Jakarta for decades. Among 14 respondents[12], six families fully rely on this source of drinking water, two families use it in addition to boiling water from the state network, and three families drink it in addition to boiling water from wells and mobile vendors. In interviews with the respondents, five families claimed to spend 7-10 per cent of their family income on water. This is a relatively high share, compared to the standards set by some international organizations, suggesting that a household should not spend more than three per cent of its income on water (Dagdeviren, 2008).

The wide-spreading informality in the water and sanitation sector is a clear example of what Miraftab (2005) has termed ‘informalizing social reproduction’. Diffuse reciprocity infiltrates the domain of public welfare services, thus keeping social reproduction cost of workers in both formal and informal economic sectors cost low.

The informalization of water and sanitation services does not necessarily lead to improved sanitary conditions in the kampungs, nor does it reinforce traditional reciprocities as a key to alternative collective provision modes. Without a collective infrastructure to recycle wastewater and protect their traditional water sources, this ambivalent situation will persist. The implementation of PUSH, the Program of Urban Sanitation & Hygiene Promotion, by the NGO Mercy Corps in 2009-10 with the construction of better quality septic tanks for 219 households has reduced faecal pollution in Kampung Kojan. The NGO continued PUSH and made

[12] These respondents were selected from project beneficiaries of Mercy Corps.

funding available to initiate community business of septage desludging and established a revolving fund in other kampungs to self-finance the construction of higher quality septic tanks. The NGO also introduced small vehicles fit to pass through the small alleys in the kampungs.

It was Mercy Corps' great concern to adapt the septage hauling services to diverse socio-economic conditions of households. However, the experiences of PELITA[13], the community desludging enterprise founded by Mercy Corps, show that these services are economically poorly sustainable. Mh, the coordinator, explains:

> If it is only one call [to desludging septic tank], we don't go [this is often the case]… the operational cost would be too high. We have to pay for two workers and their food … the fuel [to operate the machine] and [a fee for] the municipal truck [hauling the sludge to the final treatment plant].[14]

In sum, the decentralized formal and informal service provision initiatives of drinking and clean water as well as public latrines and the septage-hauling in Kampung Kojan conduct only small roles in the multi-scalar yet heavily territorialized waterscape. Reciprocal relations involving few numbers of households who, sometimes with, sometimes without NGO or state partners,

[13] An abbreviation for ***Pe****ngolahan* ***Li****mbah* ***T****inj****a*** or faecal waste treatment, but as an Indonesian word, *pelita* means 'sources of lights'.

[14] In an interview on 21 December 2011.

support these small-scale provision systems; but these particular networks of social relations are fragilized by the regular market economy that treats water as a commodity and continuously re-imposes cost and profit criteria. Having a high level of porosity, the community productive-reproductive membranes are easily penetrated by ‘solidly fluid’ pro-market institutional mechanisms reinforced by a market-oriented state planning system (section five below), thus mutating many forms of affective and nurturing activities within communities into day-to-day survival strategies.

5. Spatially Diversified Institutionalization in the Waterscape of Jakarta

Layer three of the analytical framework addresses modes of scalarly articulated institutionalization in the water sanitation sector and how they influence each other. For the water provision and sanitation sector in Jakarta, the three following institutionalization processes should be considered: (i) the state-led neo-modernist planning system in which the global corporate sector has a significant role; (ii) the procedures applied by real estate developers that are tolerated by the state to unbundle infrastructure development in the (new) middle class settlements; (iii) the informal institutionalization of water sanitation services in the territorially marginalized kampung communities. As part of the dynamics of the urban socio-ecological system, these institutionalization processes are porous and counteract, destroy, co-evolve or reinforce each other; or evolve towards an integrated governance system.

State spatial planning: corporate logic and failing delivery system

Jakarta's first wastewater plan was devised in 1977 and follows in the tracks of the neo-modernist waste water treatment systems of both the colonial and post-colonial period: centralized, technology driven and built by or in close cooperation with the corporate sector. Only a small part of the plan was implemented. Its spatial coverage coincides with the existent state sewerage system that serves only two per cent of the Jakarta urban area. Indeed, the sewerage company PDPAL Jaya tends to prioritize communities with stable purchasing power and land tenure status, leading to exclusion of many urban kampungs from the development plan.

The most recent master plan (2012) in which the national government, the provincial administration, the national public works agency and Japanese consulting firms were involved starts from the observation that Jakarta cannot be served by a single centralized system, but should be divided into fifteen zones of sewerage networks with separate wastewater treatment plants. The 2012 Master plan advocates local, individual or communal systems and incorporates institutional guidance for sustaining infrastructures (Yachiko Engineering, 2012).

However, despite these realistic starting points, major planning and implementation flaws persist: the plan counts on the market sector for building the new infrastructures; it pays only lip service to the integration of the diversity of on-site treatment technologies and favours the building of the centralized networks; it misperceives both the geological structure and spatial structure of the local communities and in particular those in the slums; it offers no concrete strategies to improve the on-site or smaller network systems that would work better in these areas; and, last but not least, no legal frameworks, administrative regulations or

financial resources have been provided to implement the plan. The most explicit expression of this policy vacuum is that until today no agency is responsible, or has the resources necessary for implementing the sanitation development policies in the whole of Jakarta. As a consequence, communities keep developing informal, fragmented small-scale service facilities, often in cooperation with local (district) authorities and NGOs.

Completely overlooking the urgent need to reinstate small-scale closed water cycles serving both water and sanitation services, the Government has proposed the controversial 2,700-hectare land reclamation project in the Jakarta Bay, claiming it would also support the latest national development policy on coastal development (the National Capital Integrated Coastal Development or NCICD). A small part of the project has been implemented at tremendous socio-environmental cost: evictions of sea-front kampung communities and destruction of the nearby islands in the Jakarta Bay through sand mining. Kampung Kojan, 10 km away from the first artificial island, is under pressure from the surrounding commercial activities. In addition to a risk of eviction of its inhabitants, the Kampung would receive more intra-urban migrations but also suffer acute infrastructural crises mainly due to a disrupted water cycle.

Privileged settlements and unbundled infrastructure planning procedures

With Jakarta's post-colonial economic growth, its middle class rose and became a privileged target group of urban spatial planning (Goldblum & Wong, 2000; Rimmer & Dick, 2009). In contrast to poor settlements, higher middle class settlements benefit from state-led investment in public space, commercial facilities and gated

residencies (Cairns, 2002; Dorleans, 2000; Firman, 2004; Goldblum & Wong, 2000; Kusno, 2002, 2010). The Kalideres sub-district with Kampung Kojan and its surroundings are a microcosm of Jakarta's spatial fragmentation and social segregation (see Figure 3).

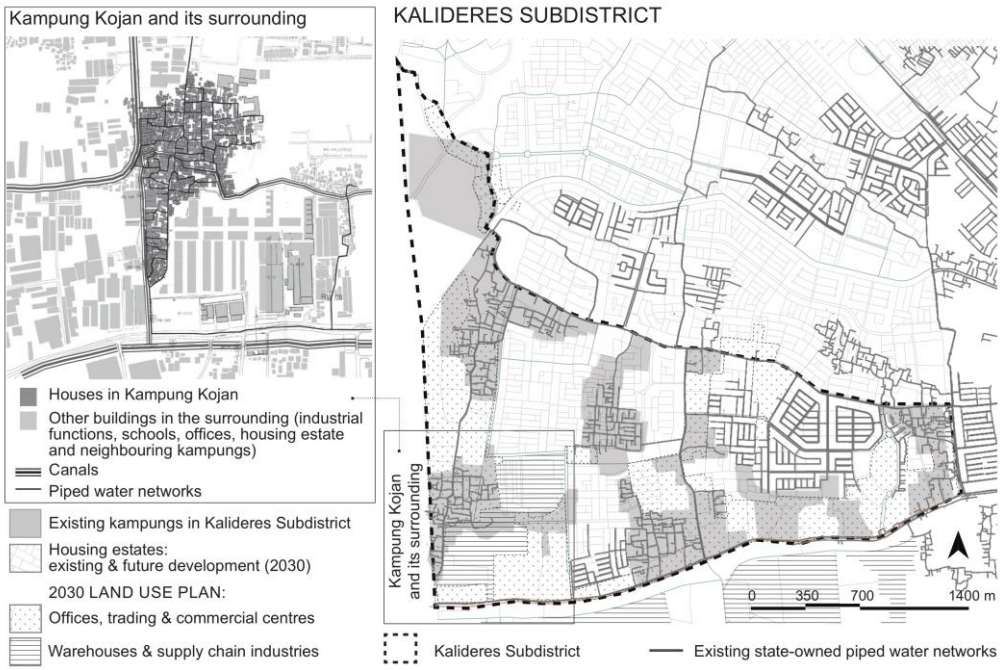

Figure 3 *[to be placed about here]*
Spatial Fragmentation around Kampung Kojan
Source: compiled and redrawn by author based on maps issued in Jakarta Master Plan 2030 as well as data and maps issued by the Jakarta Housing Agency (2004 and 2008)

In general upper and higher middle class settlements, as those adjacent to Kampung Kojan, are equipped with small-scale collective water infrastructures utilizing advanced technology, beyond what some authors call 'the archipelagos' of state piped networks (Bakker, 2003; Gopakumar, 2014). In the absence of satisfactory state-led service provision this has been the strategy of many property

developers to meet the needs of clean water and sanitation services. One developer widened the canal that passes Kampung Kojan, to channel the water to a private water treatment facility. Thanks to Mercy Corps, its sanitary education program and the septic-tank construction projects, open defecation in the Kampung has ended, pollutants in the canal significantly diminished. Thus the water also became treatable, ironically enough, to serve the middle class housing estates in the kampung's surroundings.

But the unbundling of water services has created new shortages and postponed structural solutions to the problems at the neighbourhood level. Due to unreliable small-scale piped water supply systems, housing estates but also nearby factories, often illegally, exhaust the groundwater through digging artesian wells.[15] Many experts have urged the provincial government to forbid private enterprises to overuse groundwater because this increases saltwater intrusion and land subsidence in the coastal area. The government of DKI Jakarta has responded by increasing the groundwater tax significantly. This has had an adverse impact. The tax increase reduced the revenue of PDPAL Jaya, the provincial wastewater company that manages the sewerage system in the central parts of Jakarta as some private enterprises opted to disconnect from the sewerage network[16] and many proprietors of high-rise buildings recycle their wastewater as an alternative to using ground water and paying taxes on that use.

Thus the above state groundwater tax only stimulates decentralized improvements within high-capital-intensive property development projects, such as

[15] A local leader of Kalideres and a founder of Kalideres Cooperative, in an interview on 8 November 2011.

[16] During an interview on 17 January 2011.

shopping malls, high-rise office towers and luxurious apartments. Built in the late 1970s as low-rise buildings, the housing estates surrounding Kampung Kojan are not equipped with wastewater treatment facilities for recycling wastewater. One director of PDPAL Jaya explained that the regulation for wastewater management had not been strictly imposed to housing developers. The regulation stipulates that developers must connect their housing estates to the sewerage network if the main sewer passes through the area, otherwise they should provide local collective systems. He added:

> But this [technical requirement] has not been enforced by law…. We haven't had a [mandatory] guideline for developers … [for example] one collective system for every 30 units …. There is no definitive master plan … [it has not been decided if] certain collective systems [are] suitable for this or that area.[17]

This regulatory ambiguity was confirmed by a high official of the Planning Agency of West Jakarta Municipality that is responsible for regulating spatial development in the Kalideres Subdistrict. He declared:

> We issue planning permits for developers. For areas above 5,000 square metres, we give planning advice [to follow] … the

[17] During an interview on 20 January 2011.

> size of the land parcels, land ratio for roads … open space … drainages … but not for wastewater treatment systems.[18]

Policy makers and the inhabitants of the 'better' compounds, often consider kampungs – which are often their 'neighbours' - as settlements of polluters, of sanitation-illiterate populations. But environmental practices in housing estates are not better than those in the kampungs. Many households in the estates utilize individual septic tanks.[19] Still, if faecal wastewater leaks or overflows from individual tanks, there are good drainage systems discharging unwanted water away from the estates, yet polluting nearby rivers, the soil and aquifers. This illustrates how better quality infrastructure in some areas enhances social stratifications in residential patterns. Thus housing is not only a conspicuous consumption good that reflects income inequality within cities (Saunders, 1984), but it often also metabolically reinforces the unequal access to basic infrastructure (see also Jewitt, 2011; Kaika & Swyngedouw, 2000).

Reciprocal regularization of water handling in the kampungs

Time and again kampung communities fall victim to land-grabbing for real estate developments and mega construction projects. The Jakarta Legal Aid Institute (LBH Jakarta) has reported that in 2015 alone, there were 113 cases of forced eviction in

[18] During an interview on 09 January 2012.

[19] An official of Building Authority Agency (Dinas P2B), North Jakarta Municipality, during an interview on 19 October 2012.

Jakarta, directly affecting more than 8,000 households and 6,000 units of community business. Evictions of kampung communities have debilitated the associative social relations. Oligopolistic, often global market players in the real estate sector have directly and indirectly spurred both the expansion and densification of informal settlements. Surviving enclaves of kampung communities are also threatened by service homogenization and unaffordable prices induced by the market and state driven institutionalization procedures adopted in the surrounding settlements, such as the piped water infrastructure in the housing estates neighbouring Kampung Kojan.

Nevertheless, there are opportunities to integrate different types of services, their technology and their modes of governance into a sustainable ensemble of socio-infrastructural networks. As observed in Kampung Kojan, in addition to benefiting from state-and-market-organized collective provisions, households in different social contexts satisfy their basic needs individually, develop ‘new’ habits or establish associative processes through informal institutionalization of redistribution and non-monetary exchange in solidarity and self-help networks (see Mingione, 1991, pp. 85, 132, 262-265). In cooperation with the local communities, (international) civil society organizations have taken on a significant facilitating role in the provision of the water and sanitation services in the kampungs. These organizations also have a role as mediators between the state, the corporate sector and kampung communities.

Fieldwork in Kampung Kojan revealed how civil society organizations can help weaving new associative relations. During the Mercy Corps PUSH project, tenants were willing to collectively build new latrines while Mercy Corps helped construct shared septic tanks. Around 35 semi-private septic tanks were

constructed to the benefit of the people living in rental settlements, who are generally the poorest members of the community. Access to a toilet that is located near their rooms and has a tap-water connection enables women to enjoy more privacy in their sanitary activities, and save more time for other (domestic) work that may increase their real income. Modes of usage were developed stepwise and interactively.

NGOs like Mercy Corps are no developers but seek to make creative use of the porous social space within communities and adjust the ambitions of the districts and sub-district authorities to the regulatory vacuum left by the national state and the corporate players. Local inhabitants might benefit from initiatives led by NGOs, as shown above; but it remains an open question under which conditions urban populations can act as active communities, capable of controlling their social reproduction spheres in ways to improve the wellbeing of the community members, while keeping them from becoming passive and individualist consumers instead of active citizens (see McFarlane, 2008).

6. Concluding Remarks: through institutional hybridization towards community-based governance of the waterscape

This article explains the complex configuration of socio-ecological conditions from which different types of water provision and sanitation services – structural components of the overall urban waterscape – emerged to meet the needs of rivalling human activities, communities and territories in Jakarta. It makes use of three interconnected layers of analysis: the historical-geographical metabolic development of the water provision and sanitation system; the role of informality in

meeting water and sanitation needs in interaction with the state and corporate sector; the multiple and interconnected forms of institutionalization in the water sanitation sector.

It unravels the water sanitation problems as the unsatisfied needs of diverse communities in search of healthy living conditions for which the protection of (traditional) water sources is essential. Meeting these needs would require environmental governance systems in which the local communities play a decisive role. Thus, the future water and sanitation service system should not only rely on the institutionalization of state and corporate sector infrastructures and practices, but also on the regularization of robust informal service practices.

The *first layer of the analytical framework* provides a basis to understand the contemporary socio-ecological system of water and sanitation provision as the historical-geographical outcome of not-always-quadrilateral development trajectories. A coherent ensemble of city-wide infrastructures is missing for serving the needs of all urban population groups; instead the water sanitation system consists of a patchwork of diverse modes of provision that are often territorially conflictive and socio-politically exclusive. Yet this diversity of modes of sanitation offers a rich laboratory of opportunities for applying more decentralized and diverse technologies and how they can be integrated into a city-wide ensemble of water and sanitation services. The water cycle, although socially, technically and institutionally fragmented, forms indeed a unity and occurs in great need of restoring the balance between the qualities that humans require for different water uses.

The *second analytical layer* stresses the symbiosis between the formal and informal water economy, especially at the neighbourhood level. It highlights the characteristics of the informal sector: combinations of traditional and modern practices of water provision and sanitation by households, groups of inhabitants, small enterprises; modes of cooperation based on reciprocity but also on lose forms of association with corporate players and state agencies; a high level of adaptability to changing socio-ecological conditions. Symbiosis with the 'formal' market and state sectors is all-over and confirms the necessity to consider informality as the community-based twin rather than the antagonist of market and state regularity in the institutionalization process. This process involves a mixture of building codes and modes of cooperation at the level of the kampung or district, procedures of access to water and sanitation services including network use-rights among major players (developers, industries, groups of tenants, …), unsatisfactory yet influential state regulation, etc.

The *third layer* then examines how diverse institutionalization modes of water and sanitation service provision fit, assent or event collide with different modes of spatial arrangement. These modes have hampered or reinforced each other, or mutated; and negotiated symbiotic forms of service provision. Such symbiotic forms refer to combinations of diverse technologies as well as their modes of operation and regulation. These symbiotic forms, it is found, hold a great potential for building an integrated yet heterogeneous water and sanitation service system across Jakarta's Kampungs.

The failure of the formal systems and the growing informal service provision have pressured the state and private sector to integrate and institutionalize informal practices within the current development model (see Gerlach & Franceys, 2010;

Hardoy et al., 2005). By regulating informal services, including standardizing service quality and increasing the scale of operations, the state and private sector assume that proper basic sanitation service provision for all can be achieved. However, the analysis in this article suggests that it is not a matter of technologically integrating the systems outside the piped infrastructure networks – name these systems 'informal', 'low tech', 'non-state', 'community', or 'decentralized' – into the piped networks that are governed by institutions instigated by the corporate sector and operated by the central state. Such homogenizing approach to governance would lead to a further loss of control of the water cycle by the urban communities, especially those in the kampungs. Instead different technologies and their modes of use should be recognized and connected by a multiplex but more coherent governance system. As argued by Mingione, '[the] informalization process has served to increase the importance of some local characteristics as against universal patterns' (Mingione, 1991, p. 177).

The application of the *three-layered analytical framework* shows that institutional hybridization in a capital and profit driven society can put reciprocity as the basis of informality under pressure. But other forms of institutionalization are possible, in which the reciprocity networks are improved (Mingione, 2002). Highly informal community services often serve as both productive economic and socially reproductive activities, sustaining the wellbeing of the community members. Improved reciprocity networks can be associated with a community-governed waterscape and water-wastewater cycle with relatively autonomous environmental sanitation systems capable of ensuring public health and sustaining bio-hydrological balance at the local level.

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